



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/032,687	12/28/2001	Hyung Kyun Kim	29936/38063	7293
4743	7590	04/26/2004	EXAMINER	
MARSHALL, GERSTEIN & BORUN LLP 6300 SEARS TOWER 233 S. WACKER DRIVE CHICAGO, IL 60606			GUERRERO, MARIA F	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 04/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action SummaryApplication No. **10/032,687**Applicant(s)
KIM ET AL.

Examiner

Maria Guerrero

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 February 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to the request for reconsideration filed February 2, 2004.

Claim 5 is canceled.

Claims 1-4 are pending.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant Admitted Prior art in view Harakawa (JP 07-183513) (Translation) and Beinglass et al. (U.S. 5,932,286).

Applicant Admitted Prior art teaches forming a polysilicon layer on an insulating film formed on a semiconductor substrate, forming a metal layer on the polysilicon layer, depositing a nitride layer on the metal layer, and patterning the nitride layer to form a hard mask (Fig. 1A-1B, page 2). Applicant Admitted Prior art discloses patterning the metal layer and the polysilicon layer using the patterned hard mask (Fig 1C, page 2).

Art Unit: 2822

Applicant Admitted Prior art teaches depositing a nitride film by low-pressure chemical vapor deposition, and etching the nitride film to form a spacer at a sidewall of the patterned metal layer, the patterned polysilicon layer, and the patterned hard mask (Fig. 1D, pages 2-3). Applicant Admitted Prior art shows the specific stress of the silicon nitride film formed by LPCVD (Fig. 2, page 3)

Applicant Admitted Prior art does not specifically teach depositing the nitride layer having similar stress characteristics with the hard mask layer by a low-pressure chemical vapor deposition, the hard mask having the specific thickness as claimed. However, Harakawa teaches depositing the nitride film by low-pressure chemical vapor deposition and the nitride (hard mask) having a thickness of 100 nm (1000 Angstroms) (Translation, paragraph 0011-0013).

Applicant Admitted Prior art fails to show using a single type chamber having a temperature of 600° C to 800° C and a pressure of 1 Torr to 500 Torr. Applicant Admitted Prior art fails to show using a batch type chamber having a temperature of 600° C to 800° C a pressure of 0.1 Torr to 1 Torr. However, Beinglass et al. shows depositing silicon nitride using the single type chamber having a temperature of 750° C and a pressure of 5 Torr to 100 Torr (col. 2, lines 33-55). Beinglass et al. also shows low pressure chemical vapor deposition process for the deposition of silicon nitride layers are well known in the art employing a batch-type processing chamber having a pressure of about 300 millitor (col. 1, lines 10-16).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Applicant Admitted Prior art by including the step of

Art Unit: 2822

depositing the nitride layer by low-pressure chemical vapor deposition and specifying the thickness as taught Harakawa and specifying the single type of chamber, the pressure, and the temperature as taught Beinglass et al. in order to reduce processing time. The modification would provide highly uniform silicon nitride films (Beinglass et al., col. 2, lines 19-20). In addition, a person of ordinary skill in the art would recognize that the nitride layer would have similar stress characteristics with the hard mask layer because both would be formed with the conventional low-pressure chemical vapor deposition.

Response to Arguments

4. Applicant's arguments filed February 2, 2004 have been fully considered but they are not persuasive. Claims 1-4 stand rejected.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., to prevent a lift or a crack) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Applicant argued that Applicant Admitted Prior art, Harakawa, and Beinglass et al. do not disclose the steps of "depositing a nitride film on the metal layer by low-pressure chemical vapor deposition in a single type chamber to form a hard mask layer, and depositing a nitride film having similar stress characteristics with the hard mask

Art Unit: 2822

layer by a low-pressure chemical vapor deposition method in the single type chamber, and then etching to form spacer at a sidewall of the patterned metal layer, the patterned polysilicon layer and the patterned hard mask” as recited in claim 1. However, Applicant Admitted Prior art depositing a nitride layer on the metal layer, and patterning the nitride layer to form a hard mask (Fig. 1A-1B, page 2).

Applicant Admitted Prior art discloses patterning the metal layer and the polysilicon layer using the patterned hard mask (Fig 1C, page 2). Applicant Admitted Prior art teaches depositing a nitride film by low-pressure chemical vapor deposition, and etching the nitride film to form a spacer at a sidewall of the patterned metal layer, the patterned polysilicon layer, and the patterned hard mask (Fig. 1D, pages 2-3). Harakawa is cited as evidence that would have been obvious to form the silicon nitride having similar stress characteristics with the hard mask layer by a low-pressure chemical vapor deposition method (Translation, paragraph 0011-0013). Beinglass et al. is cited as evidence that would have been obvious to specify the single type of chamber in order to reduce processing time (col. 2, lines 33-55).

Furthermore, this is not an ipsissimis verbis test, i.e., identity of terminology is not required. In re Bond, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).

In addition, during examination, the claims must be interpreted as broadly as their terms reasonably allow. This means that the words of the claim must be given their plain meaning unless applicant has provided a clear definition in the specification. In re Zletz, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989); MSM Investments

Art Unit: 2822

Co. v. Carolwood Corp., 259 F.3d 1335, 1339-40, 59 USPQ2d 1856, 1859-60 (Fed. Cir. 2001).

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Song et al. (U.S. 6,451,691) (of record) is cited as evidence to show that forming a silicon nitride hard mask and silicon nitride spacers by Low Pressure Chemical Vapor Deposition is well known in the art.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Art Unit: 2822

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 571-272-1837.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Maria Guerrero
Primary Examiner
April 22, 2004